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ABSTRACT

This document is the third of seven units developed by the Math Network Curriculum Project. Each unit, designed to be a 2-week module, is a teacher's guide which includes detailed directions along with the courseware and software needed. Teacher intervention in the non-computer activities that begin each unit is required, and the consistent use of small-group instruction makes the units usable in a standard classroom if two microcomputers are present. The Business Unit continues the work begun with Easy Speak in the Input-Output Unit, but in this unit students use the language to construct business simulations (simplified versions of programs like Lemonade) for other students to use through the network. At the beginning of the unit, students use input-output machines to discover relations between prices charged and amounts sold. They apply this skill to analyzing simplified computer simulations and finally they invent their own simulations. Printed copies of the code for the Tutor and At Your Service computer programs are included. Students use the Tutor program (designed by Diane Rezak), to find the rule for hours worked in terms of Rate. At Your Service allows students to create a business simulation game involving hours worked and rate charged. Both programs were developed for use on a Commodore PET Computer with at least 16K of RAM using 4.0 BASIC. (MNS)

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# Business

Teacher's Guide

Math Network Curriculum Project

San Francisco State University

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**Worksheets**

What's Ice Cream Worth to You?
Lemonade, Pencils, and Apple Pie
Find a Rule
The Typist
The Editor
The Pilot
Making Worksheets for Other Groups
Tutoring Service Worksheet
At Your Service Worksheet

# BUSINESS

## Teachers' Guide

## Overview

The purpose of this unit is to:

- introduce the relationship between price and demand
- help students to discover and explore these relations in the language of mathematics

This unit is designed to help students become more aware of patterns and to see mathematics as a useful language. Using mathematics as a language in this unit will help build skills basic to algebra and to applications of algebra in business.

We realize that most teachers have not studied business, and we want to assure you that we are not expecting you to have any specialized knowledge. This unit builds on the Input-Output unit and common sense ideas, such as: if you charge too much money, people won't buy from you.

This unit begins by students exploring the relationship between the price of ice cream cones and their class' demand for them. They will not be able to express this relationship mathematically, but they can move on to simulated data where they will learn to express the relationship of price to demand in much the same way they expressed rules for input-output machines. Finally, they will use this knowledge to create their own business simulations on the computer.

# HOW TO USE THIS GUIDE

Once familiar with activities in this unit, you need only refer to the Summary of Activities. To review a particular activity, a more complete description, including teaching suggestions, follows the summary of activities. We hope teachers will feel free to modify our suggestions and to use their own ideas.

We intend that most teachers using this unit will have taken a course introducing them to the units. If you have not taken such a course, you will need to read through and actually do each activity, preferably with some friends. You will need to discuss the activity's purpose and possible pitfalls as you work.

The activities in the unit are of two kinds: Total Class and Independent Computer Work. During Total Class activities, the students will work on the unit either in groups, individually, or in a whole class format. Although some of these activities may require one and a half class periods (approximately 75 minutes), others will require less time.

During the Independent Computer Work, small groups of students will work at each computer while the other students will work on classroom assignments from outside this unit. These computer activities are starred (*) so you will know that during these days your regular program will be integrated along with the activity from this unit. Generally, groups of three students will be working together at a computer. These groups will rotate during a period of several days so that all students will have the opportunity to complete the activity. Using two computers, at least four groups per class period should be able to work at the computer.

In describing the time required for an activity, we will provide the approximate number of minutes required for Total Class activities and the approximate number of days required to rotate a class of 30 students through Independent Computer Work (assuming your classroom has 2 PET computers). In total, this unit requires about 225 minutes of Total Class Time and 5 days of Independent Computer time. The activities can be spread out over a period of time. The activities in this unit are designed to be used in the sequence given.

# SUMMARY OF ACTIVITIES
## Prerequisite: Input-Output Unit

**Total Time Required:**

**Total class:** 225 minutes

***Independent Computer:** 5 days

1. **WHAT'S ICE CREAM WORTH TO YOU?**

Students construct an Input-Output table showing the number of ice cream cones they would buy a day for different costs of the cones. They find a rule about another table for a simulated gum ball business.

**Format:**
Whole Class

**Time:**
50 minutes

**Materials Needed:**
1 "What's Ice Cream Worth To You?" worksheet per student

2. **LEMONADE, PENCILS, AND APPLE PIE**

Students practice finding rules for simulated businesses.

**Format:**
Whole Class, Groups of Four, and homework

**Time:**
50 minutes plus homework

**Materials Needed:**
1 "Lemonade, Pencils, and Apple Pie" worksheet per student
1 "Find a Rule" worksheet per student

3. **The Computer Programmer**

Students learn to use three-part rules to characterize the hours people work when they charge different hourly rates.

**Format:**
Whole Class and Groups of Four

**Time:**
50 minutes

**Materials Needed:**
1 "The Typist" worksheet per student

4. **PRACTICE BUSINESSES**

Students practice finding three-part rules to relate hours worked to hourly rates for various service workers. Also, they invent their own workers.

**Format:**
Groups of Four

**Time:**
50 minutes

**Materials Needed:**
1 "The Editor" worksheet for each group
1 "The Pilot" worksheet for each group
1 "Making Worksheets for Other Groups" worksheet for each group

*5. **TUTORING SERVICE**

Students work with a computer simulation of tutors in various subject areas and find algebraic rules to describe hours worked in terms of hourly rate.

**Format:**
Groups of Three

**Time:**
2 Days (about 15 minutes per group)

**Materials Needed:**
1 computer loaded with "Tutor" program per group
1 "Tutoring Service" worksheet per group

*6. **AT YOUR SERVICE**

Students invent and investigate computer simualtions of service businesses.

**Format:**
Groups of Three

**Time:**
25 minutes Total Class and 3 days Individual Computer (25 minutes per group)

**Materials Needed:**
1 computer loaded with "At Your Service" program
3 "At Your Service" worksheets per group

* indicates Individual Computer Work.

# MATERIALS FOR THIS UNIT

**Materials**

2 PET computers

**Worksheets**

What's Ice Cream Worth to You? - 1 per student
Lemonade, Pencils, and Apple Pie - 1 per student
Find a Rule - 1 per student
The Typist - 1 per student
The Editor - 1 per group of 4
The Pilot - 1 per group of 4
Making Worksheets for Other Groups - 1 per group of 4
Tutoring Service Worksheet - 1 per group of 3
At Your Service Worksheet - 1 per student

**PET Computer Programs**

Tutoring Service
At Your Service

# WHAT'S ICE CREAM WORTH TO YOU?

**Format**
Whole Class

**Time**
50 Minutes

**Materials Needed**
1 "What's Ice Cream Worth to You?" worksheet per student

**Background**

A major theme in this unit is that demand is related to prices. This introductory activity is designed to make that relationship relevant to students. They will discover how their classes' demand for ice cream relates to the price. It will not be possible to express this relationship exactly with a mathematical formula. Businesses often find themselves in this situation. They are not able to express exactly the relationship of the price they charge to the amount they will sell. Since they need to have some information to determine their prices, they often approximate the relationship with a mathematical formula (often called a mathematical model).

Next, the students will look at some simulation businesses whose demand can be determined exactly from the prices they charge by a formula. Students should understand that these businesses are not real and that the real world does not fit so neatly into formulas. However, we can use formulas to approximate the real world and, thus, to make predictions.

**Purpose**

- To introduce students to the relationship between price and demand.
- To use Input-Output machines to find the relation between price and demand.
- To introduce the term "Zero Price Demand".

**Teacher Preparation**

Run off a copy of "What's Ice Cream worth To You?" for each student.

**Activity**

Finding Individual Demand

Tell the class that they are about to start the Business Unit, where they'll explore the relation of demand (or amount sold) to price. They are going to give some information now which will help a new business determine its prices.

Give each student a copy of the "What's Ice Cream Worth to You?" worksheet to fill in.

Finding The Class Demand

When everyone has filled in the sheet, make a table on the chalkboard like the one on the worksheet. Total the class' answers to each price to get the number of cones the whole class would buy at each price.

Discussion

Ask the class what price the Sweetcooks should charge for a cone if they were selling to this class. They should see that the price would depend on their costs (ingredients and overhead) as well as the demand. But they should also see that selling the most cones isn't the way to make the most money. They might sell more cones at zerØ cents, but they wouldn't make much money.

Zero Price Demand

Tell the class that you will call the number sold ay zero cents the "Zero Price Demand." It's the number sold when an item is given away. Usually this is the greatest number sold. As each new penny is added to the price, some demand falls away from the zero price demand.

Need for Simulations

Tell the students that businesses often find formulas to tell them approximately what their sales will be when they charge certain prices. It is unlikely that they can find a formula that links their classes' demands for ice cream cones to the prices charged. The real world isn't exact. Therefore, they'll be working with simulated businesses (made-up models) which have exact formulas. If they study business math in high school or college, they'll learn to find approximate formulas for real businesses.

## Gumballs

Put the following table on the chalkboard (or on an overhead projector):

| Price of Gumballs | Number of Gumballs sold |
|---|---|
| 0 cents | 100 |
| 1 cent | 90 |
| 2 cents | 80 |
| 3 cents | 70 |
| 4 cents | 60 |
| 5 cents | 50 |
| 6 cents | 40 |
| 7 cents | 30 |
| 8 cents | 20 |
| 9 cents | 10 |
| 10 cents | 0 |

Tell the students that the table shows the number of gumballs sold in a day for a simulated gumball business. Ask them what the Zero Price Demand is (answer is 100). Then tell them to look at the table as an Input-Output machine and find a rule for the Output, or Number Sold, in terms of Input, or Price. Write "Input" and "Output" over the appropriate columns and write "Output=".

Wait until a number of students think they know the rule. Let those students give hints for others. Then test out certain rules. For example, if someone says "Output = 10*Input-100," try an input such as 4 and see if the output is 60. Let students argue until most everyone believes that the rule is "Output = 100-10*Input. Since Output here is the "Number Sold" and Input is "Price", write:

No. Sold = 100-10*Price.

## Zero Price Demand in Rules

Ask students what role the Zero Price Demand plays in the formula. They should see that it is the most that can be sold. As the price goes up, gumballs are being taken away from those original 100. More people are deciding not to buy.

## What's Ice Cream Worth To You?

The Sweetcooks are about to open their own ice cream store featuring their homemade ice cream. They need some data to set their prices for ice cream cones. For each of the prices listed below, write how many cones you would buy a day at that price.

| Price of a Cone | Number You'd Eat a DAY |
|---|---|
| 0 cents | |
| 50 cents | |
| 100 cents | |
| 150 cents | |
| 200 cents | |
| 250 cents | |

# LEMONADE, PENCILS, AND APPLE PIE

**Format**
Whole Class, Groups of Four, and Homework

**Time**
50 minutes plus homework

**Materials Needed**
1 "Lemonade, Pencils, and Apple Pie" worksheet per student
1 "Find a Rule" homework sheet per student

## Background

In the last activity, algebraic rules were introduced to describe the relationship between demand and price for simulation businesses. This activity and the follow-up homework assignment provide students with experience in finding such rules.

Students will find the Zero Price Demand useful in stating such rules, since all the rules in this unit are of the form:

Demand = Zero Price Demand - Price * m.

(The Zero Price Demand is the y-intercept of the equation, and m is its slope.)

The number m should come to have an intuitive meaning for students; ie., m is the number the demand shrinks by for every unit increase in price. Unless students have studied the concept of slope in algebra, it is not suggested that they study the role of the number "m" formally. This unit is designed to give students practice in finding patterns. If the form:

Demand = Zero Price Demand - Price * m

is introduced to them, they will no longer look for patterns and will just be using a formula which has little meaning for them.

Therefore, in finding rules, students should be aware that the rule will involve subtraction from the Zero Price Demand. They should find the exact rule by looking for patterns and guessing as they did in the Input-Output Unit. Some students will find their own method for finding the value of m, and they should be encouraged to share their ideas with the class. However, the formula should not be forced on students who don't discover it. If students have trouble finding the rule, they should be encouraged to guess at values for m and then check them with the chart.

## Purpose

- To practice finding rules for demand (or number sold) in terms of price.

- To practice looking for patterns.

**Activity**

Review

Remind students that they are studying the relation of number of things sold to price. They will work with simulated businesses because they will need to learn much more mathematics before they can approximate "real world" businesses with rules.

Tell students that they will try to find a rule for the number of LP records sold by a store in a day, according to the price charges. Copy the chart on the chalkboard:

| Price of LPs | No. of LPs Sold |
|---|---|
| Ø | 24Ø |
| $1 | 21Ø |
| $2 | 18Ø |
| $3 | 15Ø |
| $4 | 12Ø |
| $5 | 9Ø |
| $6 | 6Ø |

After you put a few numbers on the board, see if students can guess what the next number will be. Ask students what the Zero Price Demand is for the Record Store. Then ask them to find the rule for Number Sold in terms of price (Ans. No. Sold= 24Ø-Price*3Ø). Accept answers only when a number of students are ready to volunteer. Be sure to explore answers which don't work.

If only a few students can find the rule, you should give them another problem, such as (No. Sold = 6Ø-Price*4).

**Lemonade, Pencils, and Apple Pie**

Give each student a copy of the worksheet and ahve them work in groups of 4. If some groups finish early, let them make up problems for other groups.

**Discussion**

About 10 minutes before the end of the period, go over some problems students had trouble with. Ask students how the Zero Price Demand relates to the rule. Also ask students to explain how they found the rule. They should have several valid methods.

Be sure to go over the Taco problem to make sure everyone understands how rules relate to charts.

If time permits, students can present the businesses they invented to the whole class.

**Homework**

Give each student a copy of the "Finding a Rule" homework sheet.

Business Unit

Name_____

LEMONADE, PENCILS, AND APPLE PIE

1. The chart below shows sales of cups of lemonade at different prices.

| Price of Lemonade | No. of Cups Sold |
|---|---|
| 0 | 70 |
| 10¢ | 60 |
| 20¢ | 50 |
| 30¢ | 40 |
| 40¢ | 30 |
| 50¢ | 20 |
| 60¢ | 10 |

What is the Zero Price Demand?

Answer:_____

Find a rule for No. Sold in terms of Price:

No. Sold=_____

---

2. The chart below shows sales of apple pies at different prices.

| Price of Apple Pie | No. of Pies Sold |
|---|---|
| 0 | 40 |
| $1 | 35 |
| $2 | 30 |
| $3 | 25 |
| $4 | 20 |
| $5 | 15 |
| $6 | 10 |

What is the Zero Price Demand?

Answer:_____

Find a rule for No. Sold in terms of Price:

No. Sold=_____

---

3. The chart below shows sales of pencils at different prices.

| Price of a Pencil | No. of Pencils Sold |
|---|---|
| 0 | 10 |
| 1 | 9½ |
| 2 | 9 |
| 3 | 8½ |
| 4 | 8 |
| 5 | 7½ |
| 6 | 7 |

What is the Zero Price Demand?

Answer:_____

Find a rule for No. Sold in terms of price:

No. Sold=_____

---

4. For a certain taco stand, the rule for number of tacos sold in terms of Price is:

No. Sold= 420-Price*3.

What is the Zero Price Demand?

Answer:_____

Fill in the chart for the Taco Stand:

| Price of a Taco | No. of Tacos Sold |
|---|---|
| 40 | _____ |
| 60 | _____ |
| 90 | _____ |
| _____ | 120 |
| 140 | _____ |

---

5. The chart below shows sales of a brand of blue jeans at different prices.

| Price of Blue Jeans | No. of Blue Jeans Sold |
|---|---|
| $5 | 125 |
| $10 | 100 |
| $15 | 75 |
| $20 | 50 |
| $25 | 25 |
| $30 | 0 |

What is the Zero Price Demand?

Answer:_____

Find a rule for No. Sold in terms of Price:

No. Sold=_____

6. Make a business with a rule and a chart. Fill in the chart below and see if another group can find your Zero Price Demand and your rule.

# FIND A RULE

Name _____

1. The chart below shows sales of T-shirts at various prices.

| Price of T-shirt | No. of T-Shirts Sold |
|---|---|
| 0 | 12 |
| $2 | 10 |
| $4 | 8 |
| $6 | 6 |
| $8 | 4 |
| $10 | 2 |
| $12 | 0 |

What is the Zero Price Demand?

_____

Find a rule for No. Sold in terms of Price:

No. Sold= _____

2. The chart below shows sales of cans of soda pop in terms of price.

| Price of Soda | No. of Cans Sold |
|---|---|
| 20¢ | 80 |
| 30¢ | 60 |
| 40¢ | 40 |
| 50¢ | 20 |
| 60¢ | 0 |

What is the Zero Price Demand?

_____

Find a rule for No. Sold in terms of Price:

No. Sold= _____

3. The chart below shows sales of apples in terms of price.

| Price of an Apple | No. of Apples Sold |
|---|---|
| 2 | 19 |
| 4 | 18 |
| 6 | 17 |
| 8 | 16 |
| 10 | 15 |
| 12 | 14 |
| 14 | 13 |

What is the Zero Price Demand?

_____

Find a rule for Apples in terms of Price:

No. Sold= _____

4. For a certain candy store, the sales of Caramel Wonder candy bars is related to price by:

No. Sold= 900-Price*15

What is the Zero Price Demand for Caramel Wonder candy bars?

_____

Fill in the chart for Caramel Wonder candy bars:

| Price of a Caramel Wonder | Number of Caramel Wonders Sold |
|---|---|
| 10¢ | _____ |
| 20¢ | _____ |
| 50¢ | _____ |
| _____ | 450 |
| 55¢ | _____ |
| _____ | 0 |

# THE COMPUTER PROGRAMMER

**Format**
Whole Class and
Groups of 4

**Time**
50 Minutes

**Materials Needed**
1 Copy of
"The Typist"
Worksheet
for each student

**Background**

At this point in the unit, students should be able to find rules for demand in terms of price. If a number of your students cannot do this, work some more examples in class and have them work on another worksheet like "Lemonade, Pencils, and Apple Pies." You should not continue with this unit until almost all your students are able to find rules.

In this unit students will find rules for Service Businesses. In these businesses people charge an hourly rate, which determines how many hours work they will get. These business do not involve complications such as overhead and raw materials. Thus, they are simple enough to be realistic.

The new idea in this activity is that people cannot work more than a certain number of hours a week. Also, they can never work less than zero hours a week. Therefore, if we want to use algebra to characterize their hours in terms of their price, we often encounter conditional rules in the Input-Output unit. In this unit they will find a practical application for these rules.

**Purpose**

-To find conditional rules for Service Business.

-To allow students to make up rules and worksheets for others.

**Teacher Preparation**

If students had trouble with the worksheet in the last class, you will need to make up a similar one.

Read over the activity so you will be familar with three-part conditional rules.

Run off copies of the typist worksheet (1 per student).

**Activity**

Homework Discussion

Have students explain their answers for the homework problems.

Ask students how the number the price is multiplied by in the rules relates to the chart. They will have several ways of expressing this. One way is that the number tells how much is subtracted from the demand when the price increases by one.

Again, spend some time discussing how students solved the problems. this discussion will show them that there are many methods to solve problems in mathematics.

The Computer Programmer

Tell students there is a computer programmer whose earnings depend on the rate she charges for her work. When she charges $1,000 an hour, she gets no work. Have the students guess hourly rates for the programmer and tell them the number of hours she works a week according to the rule:

Hours = 200 - 4 * Rate.

They should get a table that looks something like this:

| Rate | Hours |
|---|---|
| 1000 | 0 |
| 3 | 188 |
| 8 | 168 |
| 100 | -200 |
| 50 | 0 |
| 40 | 40 |
| 0 | 200 |

Ask students to find the Zero Price Demand and the Rule for Hours in terms of Rate.

Once the students have symbolized the rule, you can add a third column for weekly earnings:

| Rate | Hours | Weekly Earnings |
|---|---|---|
| 1000 | 0 | 0 |
| 3 | 188 | 564 |
| 8 | 168 | 1344 |
| 100 | -200 | Doesn't Make Sense |
| 50 | 0 | 0 |
| 40 | 40 | 1600 |
| 0 | 200 | 0 |

Need Conditional Rules

They will also note that for Rates greater than $50 the rule doesn't make sense, since the programmer won't owe people money, she'll just get no money whether she charges $51 an hour or $373 an hour.

Next, ask them if they think the programmer will really make $564 a week if she charges $3 an hour. With some prodding (please don't tell them), they should see that the programmer can't work 188 hours a week since there are only 168 hours in a week and she needs time to eat, sleep, and relax. Thus, the programmer needs to choose a maximum number of hours a week to work. Let the class choose some number of hours, say 40. Then, even though she could get enough customers for 188 hours work when she charges $3 an hour, the programmer will only work 40 hours and earn $120 a week.

Ask students to find the rate she should charge so she'll work exactly 40 hours. they can do this by trial and error or by more sophisticated methods. Let them use their own method, although several students can describe the method they used. The rate for 40 hours is $40 an hour. Help the students to understand that since she only wants to work 40 hours a week, she might as well charge $40 an hour, since she doesn't need any more hours.

The Three-Part Rule

Thus, the rule for the hours the programmer works has three parts:

If Rate < 40 then Hours = 40

If 40 $\leq$ Rate $\leq$ 50 then Hours = 200 - 4 * Rate

If Rate > 50 then Hours = 0

## The Typist

Give each student a copy of "The Typist" worksheet and ask them to fill in the weekly earnings column. While students are working, copy the table from the worksheet on the chalkboard.

After the students give the Weekly Earnings for each rate, ask them what the Zero Price Demand is. It appears to be 40 hours, but that is just the maximum hours the typist will work. The actual demand for his services is higher.

Ask students how they think could find this demand. Given a few minutes, they should suggest following the pattern of the hours worked as shown below:

| Rate | Hours Worked |
|---|---|
| 0 | 100 |
| 1 | 90 |
| 2 | 80 |
| 3 | 70 |
| 4 | 60 |
| 5 | 50 |
| 6 | 40 |
| 7 | 30 |
| 8 | 20 |
| 9 | 10 |
| 10 | 0 |

Thus, the actual Zero Price Demand for the typists is 100 hours a week.

Now see if the students can answer the questions on the worksheet. The answers are:

1. 40 Hours
2. $10 an Hour
3. If Rate <6 then hours=40
   If 6< Rate< 10 then Hours=100-10*Rate
   If Rate>10 then Hours=0
4. $6 an Hour.

## The Typist

Name_____

The table below shows the number of hours a typist will work a week depending on the hourly rate he charges. Fill in the column for his Weekly Earnings, then answer the questions below.

| RATE | HOURS WORKED | WEEKLY EARNINGS |
|---|---|---|
| 0 | 40 | |
| 1 | 40 | |
| 2 | 40 | |
| 3 | 40 | |
| 4 | 40 | |
| 5 | 40 | |
| 6 | 40 | |
| 7 | 30 | |
| 8 | 20 | |
| 9 | 10 | |
| 10 | 0 | |
| 11 | 0 | |
| 12 | 0 | |

1. What do you think are the maximum hours a week the Typist has chosen to work?

2. What's the rate the Typist will charge when he begins to get no business?

3. Try to write a rule for the Hours Worked in terms of the Rate the Typist charges. (It may have more than one part.)

4. What rate should the Typist charge if he wants to maximize his earnings?

# PRACTICE BUSINESSES

**Format**
Groups of 4

**Time**
50 minutes

**Materials Needed**
- 1 "The Editor" worksheet for each group of 4 students
- 1 "The Pilot" worksheet for each group of 4 students
- 1 "Making Worksheets for Other Groups" worksheet for each group of 4 students

**Purpose**

- To practice finding rules for demand (or hours worked) in terms of price (or rate charged).
- To allow students to make up rules and worksheets for others.

**Teacher Preparation**

Run off copies of all the worksheets.

Write the chart from "The Typist" worksheet on the chalkboard.

**Activity**

Purpose

Tell students they will be creating computer games about workers. The worksheets they will do today should give them some understanding about rules, connecting Hours Worked and Rates.

Review

Review "The Typist" worksheet with them. In particular, point out how useful it was to know the Zero Price Demand for the typist to find the rule connecting Hours Worked with Rate. Review how they used the pattern of the Hours Worked to find the Zero Price Demand.

Ask students which was the best price to charge. They should see that the typist makes the most money when he works 40 hours at $6 an hour. Ask them if they think the best thing to do is to change the rate where you work your maximum. They will see if this system works on the other worksheets.

New Worksheets

Have students form groups of four, and give each group a copy of the three worksheets. As groups finish making worksheets for other groups, have them exchange these worksheets.

Discussion

Go over any questions which were troublesome to students.

Then ask the students what is the best price to charge. Let them propose different theories. They should see that what worked for the Typist (working his maximum hours) doesn't work for the Editor or the Pilot. Sometimes, but not always, you make more money by working less! See if they can explain why this is true.

Group Names 1._____

2._____

3._____

4._____

## The Editor

The table below shows the number of hours an editor will work a week depending on the hourly rate he charges. Fill in the column for his Weekly Earnings, then answer the questions below.

| RATE | HOURS WORKED | WEEKLY EARNINGS |
|---|---|---|
| 0 | 40 | |
| 5 | 30 | |
| 10 | 20 | |
| 15 | 10 | |
| 20 | 0 | |
| 25 | 0 | |
| 30 | 0 | |
| 35 | 0 | |

1. What do you think are the maximum hours a week the Editor has chosen to work?

2. What's the rate the Editor will charge when he begins to get no business?

3. Try to write a rule for the Hours Worked in terms of the Rate the Editor charges. (It may have more than one part.)

4. What rate should the Editor charge if he wants to maximize his earnings?

Group names_____

_____

_____

_____

## THE PILOT

The table below shows the number of hours a pilot will work a week depending on the hourly rate she charges. Fill in the column for her Weekly Earnings, then answer the questions below.

| RATE | HOURS WORKED | WEEKLY EARNINGS |
|---|---|---|
| 10 | 20 | |
| 15 | 20 | |
| 20 | 20 | |
| 25 | 17½ | |
| 30 | 15 | |
| 35 | 12½ | |
| 40 | 10 | |
| 45 | 7½ | |
| 50 | 5 | |
| 55 | 2½ | |
| 60 | 0 | |
| 65 | 0 | |

1. What do you think are the maximum hours a week the Pilot has chosen to work?

2. What's the rate the Pilot will charge when she begins to get no business?

3. Try to write a rule for the Hours Worked in terms of the Rate the Pilot charges. (It may have more than one part.)

4. What rate should the Pilot charge if she wants to maximize her earnings?

## MAKING WORKSHEETS FOR OTHER GROUPS

Directions (Below each step for writing your worksheet is the step followed in making The Typist Worksheet.)

1. Choose a profession for your worker.
   Example:
   Typist

2. Choose a one-part rule that connects Hours Worked with Rate.
   Example:
   Hours = 100 - 10 * Rate

3. Fill in a table for your rule.
   Example:

| RATE | HOURS WORKED |
|---|---|
| 0 | 100 |
| 1 | 90 |
| 2 | 80 |
| 3 | 70 |
| 4 | 60 |
| 5 | 50 |
| 6 | 40 |
| 7 | 30 |
| 8 | 20 |
| 9 | 10 |
| 10 | 0 |
| 11 | 0 |

4. Choose a maximum number of hours for your worker to work.
   Example:
   40 hours

5. Change your table so no hours worked are more than your maximum.
   Example:

| RATE | HOURS WORKED |
|---|---|
| 0 | ~~100~~ 40 |
| 1 | ~~90~~ 40 |
| 2 | ~~80~~ 40 |
| 3 | ~~70~~ 40 |
| 4 | ~~60~~ 40 |
| 5 | ~~50~~ 40 |
| 6 | 40 |
| 7 | 30 |
| 8 | 20 |
| 9 | 10 |
| 10 | 0 |
| 11 | 0 |

6. Make up some questions about your worker for another group.
   Example:
   See The Typist worksheet.

7. Make a worksheet that includes the changed table and your questions.
   Example:
   See The Typist worksheet.

8. Exchange worksheets with another group.
   Example:
   You can do this yourself.

# *TUTORING SERVICE

**Format**
Groups of three

**Time**
2 days
(about 15 minutes per group)

**Materials Needed**
1 computer loaded with Tutor Program per group
1 Tutoring Service worksheet per group

## Background

At this stage in the unit, students should have some understanding of the relation between price and demand and, given some data, they should have some skill in finding a rule to link the rate charged with the hours worked. In the activity after this, students will create a computer simulation game for others to play using a rule they invent to link rate with hours worked. This present activity will introduce them to the type of computer simulation they will later be creating.

## Purpose

- To introduce students to the type of Business simulation they will later create
- To provide students with further practice in guessing rules between rates charged and hours worked

## Teacher Preparation

Run off copies of the Tutoring Service worksheet (one for each group of three students).

Before class, load each computer with the Tutor Program (It takes about five minutes to load).

Plan another activity for students who aren't using the computer.

## Activity

Tell the students that later in the unit, using Easy Speak, they will create their own computer business simulation games for others to play. Before creating their own, they should have practice with one someone else invented.

In the program, they will be asked to choose the subject they will tutor. They should record that subject on the worksheet and shouldn't change that

subject until they are able to fill out the sheet for that subject. Different subjects have different rules.

They will need to record on their worksheet the hours worked for different rates. They may not have time to find the rule for Hours Worked in terms of Rate while they are at the machine. But they can do that at their seats if they have enough data in the table.

If they have enough time at the computer to find the rule for one subject, they can get another sheet and try another subject.

Tell students that there are graphics which come on between the time they enter their rate and are told the hours they work. If they want to skip the graphics, they can push SHIFT @ anytime after they have entered their rate.

Help them form groups of three and schedule the groups for the computers. They should only need about 15 minutes to collect enough data to find the rule.

Group Names:

1. _____

2. _____

3. _____

4. _____

## TUTORING SERVICE WORKSHEET

1. What subject did you tutor?

   _____

2. Make a table of the hours you worked and earnings for each rate. (Type Shift and @ if you don't want to wait for results.)

| RATE | HOURS WORKED | EARNINGS |
|---|---|---|
| | | |

3. What Rate should you charge if you want to maximize your earnings?

4. Try to write a rule for the Hours Worked in terms of the Rate you charge:

# * AT YOUR SERVICE

**Format**
Whole class and
Groups of three

**Time**
25 minutes Whole Class
3 days Individual Computer
(about 25 minutes per group on the computer)
(about 25 minutes per group before using the computer)

**Materials Needed**
1 computer loaded with At Your Service program per group
3 At Your Service worksheets per group

## Background

The At Your Service program allows students to create a business simulation game. Students will use the Easy Speak language which they learned in the Input-Output unit. The purpose of expressing a rule for hours worked in terms of rate charged is to give students a feeling for algebraic rules.

Students are often interested in discovering rules, such as the relation of the radius of a circle to its circumference. However, students are less interested in expressing rules with symbols.

But symbolizing ideas or rules is key to the use of algebra. When we use algebra to solve real world problems, we must first express the problem symbolically (in the language of algebra). Then we manipulate the symbols to get an answer to our original problem. The most difficult part of that process is to express the ideas in the problem symbolically.

We believe that expressing relationships in At Your Service in the language of Easy Speak will help students in their later work with algebra. They actually will see the practical implications of the algebraic equation they create. They will be motivated to play with their equation to see what kinds of situations it creates.

In creating their business simulation game with At Your Service, students can use up to two variables: RATE and AD. RATE stands for the rate the player charges for the service. AD stands for the amount the player decides to spend on advertising. Students can have the hours work a player will get depend on only RATE or on both RATE and AD. The latter game is harder to predict and also more interesting. You should decide whether your class is ready for the extra challenge of handling the extra variable, AD.

## Purpose

- Students will create business simulations using At Your Service.

- Students will see the results of different algebraic equations they invent.

**Teacher Preparation**

Run off copies of the At Your Service worksheet (about one per student).

Load each computer with the At Your Service program (it takes about five minutes to load). Put one computer where the whole class can see its screen.

Practice using At Your Service before class.

Students will need other work to do when they aren't at the computer or preparing their simulation.

**Activity**

Introduction

Tell the students that they can now invent computer simulations, like "Tutor", for others to play. First they will invent one as a class. Then they will work in grouups to invent another one.

Inventing A Simulation

Run "At Your Service" on the computer facing the class. They will first have to type "a" to create a new business.

They must now decide on a name for their class Business. Enter it on the computer.

Ask them to decide what are the most hours per week that someone should work at their business.

Now the computer wants to know if players can increase their hours by advertising. Type "Y" or "N", depending on whether you want them to use AD or not.

Finally, the computer asks for a formula for the number of hours a player will work. Tell students that the hours should depend on the rate the player will charge (and how much the player spends on advertising). Remind them of the formulas they found for tutor. Type any formula they suggest, preferably one that will give unlikely results, into the

computer. The formula must be written in Easy Speak using RATE (and AD).

Playing with the Simulation

Now type "&" while holding the shift key, and then type "e" to play the game.

As the class plays the game by suggesting rates (and amounts to spend on advertising), record the results on the chalkboard in a chart:

| RATE | AD | NO.OF HOURS | EARNINGS |
|---|---|---|---|

After trying several different combinations, ask them if they worked the number of hours that they expected. You should ask them to suggest a new Rate (and Ad) and have them predict what the Hours will be, using their formula. Check their result with the computer.

See if they can find what their maximum earnings can be per week. If they used Ad, this amount could be limitless. You might ask for suggestions about how to make the formula more realistic.

Group Work

Have students work in groups of 3. Give each group several worksheets. They should use the worksheets as a group, taking a new one when they change their simulation.

Have them fill out the first two parts of the worksheet before going to the computer. Encourage them to try different formulas. The point of this activity is to have them experience the results of their formulas (ie. to get a feel for what the consequences will be when they make changes). It is not important for them to come up with realistic simulations.

Sharing

They can save their simulations on tape or on the Network. After exploring their own simulations, they might like to try ones that others have invented.

Group Names: _____

_____

_____

_____

## AT YOUR SERVICE WORKSHEET

**Part I**

1. YOUR BUSINESS' NAME IS:

2. THE MOST HOURS A PLAYER MAY WORK IS:

3. CAN PLAYERS ADVERTISE? (Y or N)

4. THE HOURS OF WORK A PLAYER GETS=

**Part II**

Before trying your simulation on the computer, predict:

1. What is the Zero Price Demand?
   (If you are using AD, answer this for several values of AD).

2. What is the best RATE (or combination of RATE and AD) to charge to make the most money?

3. How much money will you make in that situation?

**Part III**

Run your simulation on the computer. Try different rates and amounts of advertising. Fill in some values on the chart.

| RATE | AD | Hours Worked | Amount Earned |
|---|---|---|---|

1. What is your Zero Price Demand?
   (If you used AD, answer for several values of AD.)

2. What is the best RATE (or combination of RATE and AD) to charge to make the most money?

3. How much money do you make in that situation?

# Worksheets

## What's Ice Cream Worth To You?

The Sweetcooks are about to open their own ice cream store featuring their homemade ice cream. They need some data to set their prices for ice cream cones. For each of the prices listed below, write how many cones you would buy a day at that price.

| Price of a Cone | Number You'd Eat a DAY |
|---|---|
| 0 cents | |
| 50 cents | |
| 100 cents | |
| 150 cents | |
| 200 cents | |
| 250 cents | |

Business Unit

Name _____

# LEMONADE, PENCILS, AND APPLE PIE

1. The chart below shows sales of cups of lemonade at different prices.

| Price of Lemonade | No. of Cups Sold |
|---|---|
| 0 | 70 |
| 10¢ | 60 |
| 20¢ | 50 |
| 30¢ | 40 |
| 40¢ | 30 |
| 50¢ | 20 |
| 60¢ | 10 |

What is the Zero Price Demand?

Answer: _____

Find a rule for No. Sold in terms of Price:

No. Sold= _____

---

2. The chart below shows sales of apple pies at different prices.

| Price of Apple Pie | No. of Pies Sold |
|---|---|
| 0 | 40 |
| $1 | 35 |
| $2 | 30 |
| $3 | 25 |
| $4 | 20 |
| $5 | 15 |
| $6 | 10 |

What is the Zero Price Demand?

Answer: _____

Find a rule for No. Sold in terms of Price:

No. Sold= _____

---

3. The chart below shows sales of pencils at different prices.

| Price of a Pencil | No. of Pencils Sold |
|---|---|
| 0 | 10 |
| 1 | 9½ |
| 2 | 9 |
| 3 | 8½ |
| 4 | 8 |
| 5 | 7½ |
| 6 | 7 |

What is the Zero Price Demand?

Answer: _____

Find a rule for No. Sold in terms of price:

No. Sold= _____

---

4. For a certain taco stand, the rule for number of tacos sold in terms of Price is:

No. Sold= 420-Price*3.

What is the Zero Price Demand?

Answer: _____

Fill in the chart for the Taco Stand:

| Price of a Taco | No. of Tacos Sold |
|---|---|
| 40 | _____ |
| 60 | _____ |
| 90 | _____ |
| _____ | 120 |
| 140 | _____ |

---

5. The chart below shows sales of a brand of blue jeans at different prices.

| Price of Blue Jeans | No. of Blue Jeans Sold |
|---|---|
| $5 | 125 |
| $10 | 100 |
| $15 | 75 |
| $20 | 50 |
| $25 | 25 |
| $30 | 0 |

What is the Zero Price Demand?

Answer: _____

Find a rule for No. Sold in terms of Price:

No. Sold= _____

---

6. Make a business with a rule and a chart. Fill in the chart below and see if another group can find your Zero Price Demand and your rule.

# FIND A RULE

Name _____

1. The chart below shows sales of T-shirts at various prices.

| Price of T-shirt | No. of T-Shirts Sold |
|---|---|
| 0 | 12 |
| $2 | 10 |
| $4 | 8 |
| $6 | 6 |
| $8 | 4 |
| $10 | 2 |
| $12 | 0 |

What is the Zero Price Demand?

_____

Find a rule for No. Sold in terms of Price:

No. Sold= _____

2. The chart below shows sales of cans of soda pop in terms of price.

| Price of Soda | No. of Cans Sold |
|---|---|
| 20¢ | 80 |
| 30¢ | 60 |
| 40¢ | 40 |
| 50¢ | 20 |
| 60¢ | 0 |

What is the Zero Price Demand?

_____

Find a rule for No. Sold in terms of Price:

No. Sold= _____

3. The chart below shows sales of apples in terms of price.

| Price of an Apple | No. of Apples Sold |
|---|---|
| 2 | 19 |
| 4 | 18 |
| 6 | 17 |
| 8 | 16 |
| 10 | 15 |
| 12 | 14 |
| 14 | 13 |

What is the Zero Price Demand?

_____

Find a rule for Apples in terms of Price:

No. Sold= _____

4. For a certain candy store, the sales of Caramel Wonder candy bars is related to price by:

No. Sold= 900-Price*15

What is the Zero Price Demand for Caramel Wonder candy bars?

_____

Fill in the chart for Caramel Wonder candy bars:

| Price of a Caramel Wonder | Number of Caramel Wonders Sold |
|---|---|
| 10¢ | _____ |
| 20¢ | _____ |
| 50¢ | _____ |
| _____ | 450 |
| 55¢ | _____ |
| _____ | 0 |

# The Typist

Name_____

The table below shows the number of hours a typist will work a week depending on the hourly rate he charges. Fill in the column for his Weekly Earnings, then answer the questions below.

| RATE | HOURS WORKED | WEEKLY EARNINGS |
|---|---|---|
| 0 | 40 | |
| 1 | 40 | |
| 2 | 40 | |
| 3 | 40 | |
| 4 | 40 | |
| 5 | 40 | |
| 6 | 40 | |
| 7 | 30 | |
| 8 | 20 | |
| 9 | 10 | |
| 10 | 0 | |
| 11 | 0 | |
| 12 | 0 | |

1. What do you think are the maximum hours a week the Typist has chosen to work?

2. What's the rate the Typist will charge when he begins to get no business?

3. Try to write a rule for the Hours Worked in terms of the Rate the Typist charges. (It may have more than one part.)

4. What rate should the Typist charge if he wants to maximize his earnings?

Group Names 1. _____

2. _____

3. _____

4. _____

## The Editor

The table below shows the number of hours an editor will work a week depending on the hourly rate he charges. Fill in the column for his Weekly Earnings, then answer the questions below.

| RATE | HOURS WORKED | ... WEEKLY EARNINGS |
|---|---|---|
| 0 | 40 | |
| 5 | 30 | |
| 10 | 20 | |
| 15 | 10 | |
| 20 | 0 | |
| 25 | 0 | |
| 30 | 0 | |
| 35 | 0 | |

1. What do you think are the maximum hours a week the Editor has chosen to work?

2. What's the rate the Editor will charge when he begins to get no business?

3. Try to write a rule for the Hours Worked in terms of the Rate the Editor charges. (It may have more than one part.)

4. What rate should the Editor charge if he wants to maximize his earnings?

Group names_____

_____

_____

_____

## THE PILOT

The table below shows the number of hours a pilot will work a week depending on the hourly rate she charges. Fill in the column for her Weekly Earnings, then answer the questions below.

| RATE | HOURS WORKED | WEEKLY EARNINGS |
|---|---|---|
| 10 | 20 | |
| 15 | 20 | |
| 20 | 20 | |
| 25 | 17½ | |
| 30 | 15 | |
| 35 | 12½ | |
| 40 | 10 | |
| 45 | 7½ | |
| 50 | 5 | |
| 55 | 2½ | |
| 60 | 0 | |
| 65 | 0 | |

1. What do you think are the maximum hours a week the Pilot has chosen to work?

2. What's the rate the Pilot will charge when she begins to get no business?

3. Try to write a rule for the Hours Worked in terms of the Rate the Pilot charges. (It may have more than one part.)

4. What rate should the Pilot charge if she wants to maximize her earnings?

## MAKING WORKSHEETS FOR OTHER GROUPS

Directions (Below each step for writing your worksheet is the step followed in making The Typist Worksheet.)

1. Choose a profession for your worker.
   Example:
   Typist

2. Choose a one-part rule that connects Hours Worked with Rate.
   Example:
   Hours = 100 - 10 * Rate

3. Fill in a table for your rule.
   Example:

| RATE | HOURS WORKED |
|---|---|
| 0 | 100 |
| 1 | 90 |
| 2 | 80 |
| 3 | 70 |
| 4 | 60 |
| 5 | 50 |
| 6 | 40 |
| 7 | 30 |
| 8 | 20 |
| 9 | 10 |
| 10 | 0 |
| 11 | 0 |

4. Choose a maximum number of hours for your worker to work.
   Example:
   40 hours

5. Change your table so no hours worked are more than your maximum.
   Example:

| RATE | HOURS WORKED |
|---|---|
| 0 | ~~100~~ 40 |
| 1 | ~~90~~ 40 |
| 2 | ~~80~~ 40 |
| 3 | ~~70~~ 40 |
| 4 | ~~60~~ 40 |
| 5 | ~~50~~ 40 |
| 6 | 40 |
| 7 | 30 |
| 8 | 20 |
| 9 | 10 |
| 10 | 0 |
| 11 | 0 |

6. Make up some questions about your worker for another group.
   Example:
   See The Typist worksheet.

7. Make a worksheet that includes the changed table and your questions.
   Example:
   See The Typist worksheet.

8. Exchange worksheets with another group.
   Example:
   You can do this yourself.

Group Names:

1. _____

2. _____

3. _____

4. _____

## TUTORING SERVICE WORKSHEET

1. What subject did you tutor?

   _____

2. Make a table of the hours you worked and earnings for each rate. (Type Shift and @ if you don't want to wait for results.)

| RATE | HOURS WORKED | EARNINGS |
|---|---|---|
| | | |

3. What Rate should you charge if you want to maximize your earnings?

4. Try to write a rule for the Hours Worked in terms of the Rate you charge:

Group Names: _____

_____

_____

_____

## AT YOUR SERVICE WORKSHEET

**Part I**

1. YOUR BUSINESS' NAME IS:

2. THE MOST HOURS A PLAYER MAY WORK IS:

3. CAN PLAYERS ADVERTISE? (Y or N)

4. THE HOURS OF WORK A PLAYER GETS=

**Part II**

Before trying your simulation on the computer, predict:

1. What is the Zero Price Demand?
   (If you are using AD, answer this for several values of AD).

2. What is the best RATE (or combination of RATE and AD) to charge to make the most money?

3. How much money will you make in that situation?

**Part III**

Run your simulation on the computer. Try different rates and amounts of advertising. Fill in some values on the chart.

| RATE | AD | Hours Worked | Amount Earned |
|---|---|---|---|

1. What is your Zero Price Demand?
   (If you used AD, answer for several values of AD.)

2. What is the best RATE (or combination of RATE and AD) to charge to make the most money?

3. How much money do you make in that situation?

# TUTOR 1.3

```
READY.

 10 REM TUTOR 1.3
 20 REM DESIGNED BY DIANE RESEK
 30 REM PROGRAMMED BY CHARLIE WILSON & BILL FINZER
 40 REM COPYRIGHT 1982, MATH NETWORK CURRICULUM PROJECT, SFSU
 50 REM DESIGNED TO RUN ON A 16K PET WITH BASIC 3.0 OR GREATER
 1000 REM ---MAIN PROGRAM---
 1010 GOSUB 1200INIT
 1015 GOSUB 6000 TITLE PAGE
 1020 GOSUB 1600 RULES
 1030 GOSUB 1400 GET NAME
 1035 GOSUB 1800 SUBJECT AREA
 1050 FOR WNMBR=1 TO MWEEKS
 1060 GOSUB 2000 GET RATE
 1070 GOSUB 2200 TUTOR A WEEK
 1080 GOSUB5800
 1090 X=0:Y=0:GOSUB 8800
 1100 IFWN<>MW THENPRINT"DO YOU WANT TO TUTOR ANOTHER WEEK ":GOSUB 7000
 1110 IF NOT YES THEN 1150
 1120 NEXT WNMBR
 1125 L=3:GOSUB5800 CLEAR TOP
 1130 X=0:Y=0:GOSUB8800GOTO QUEST SPACE
 1140 PRINT"■THE SUMMER IS OVER.":PRINT"PRESS RETURN TO SEE A SUMMARY"
 1145 PRINT"OF HOW YOU DID.":X=0:Y=23:GOSUB8800:GOSUB7200
 1150 GOSUB 2600PRINT SUMMARY
 1160 GOSUB 2800 CLOSE
 1170 END
 1200 REM INITIALIZATION
 1205 MWEEKS=12
 1210 DIM HX%(11),HY%(11),DAY$(4),EARN(MW)
 1215 DIM DEMAN(MW),RATE(MW),MRATE%(10),MHRS%(10),LHRS%(10),THGHT$(10)
 1220 D$="■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■"
 1225 PRINT"■";:REM CLEAR SCREEN
 1230 DAY$(0)="MON":DAY$(1)="TUE"
 1235 DAY$(2)="WED":DAY$(3)="THU"
 1240 DAY$(4)="FRI"
 1245 DEF FNRD(I)=INT((I*100)+.49)/100
 1250 GOSUB9000 INIT THOUGHTS
 1255 POKE 59468,12:REM GRAPHIC
 1260 R$="":REM REVERSE FIELD OFF
 1265 TR=-1:FA=0:REM TRUE - FALSE
 1270 DATA "SCIENCE",42,30,14,"MATH",45,25,30
 1275 DATA "SPANISH",32,20,8,"PROGRAMMING",60,25,40,"ENGLISH",30,25,15,END
 1280 NS=0
 1285 CHOICE =-1
 1290 READ S$:IF S$="END" THEN 1300
 1295 SB$(NS)=S$:READ MHRS%(NS),LHRS%(NS),MRATE%(NS):NS=NS+1:GOTO1290
 1300 DATA 31,3,33,4,35,5,37,6,35,7,33,8,31,9,29,8,27,7,25,6,27,5,29,4
 1310 FOR I=0 TO 11:READ HX%(I),HY%(I):NEXT I
 1390 RETURN
 1400 REM --GET PERSON'S NAME--
 1405 L=8:GOSUB5800
 1410 X=XQUEST:Y=YQUEST:GOSUB 8800
 1420 PRINT"WHAT IS YOUR NAME? ";
 1430 B$="":GOSUB 8400:NAME$=B$
 1440 GOSUB6600 PAINT TUTOR
```

```
1445 GOSUB6800 PAINT TABLE
1450 GOSUB 5200 UNCONFUSE
1590 RETURN
1600 REM --RULES--
1605 L=3:GOSUB 5800:PRINT"■";
1608 PRINT"DO YOU WANT THE RULES ";:GOSUB 7000
1610 IF NOT YES THENPRINT:GOTO 1740
1620 L=3:GOSUB5800:PRINT"■                    ■RULES
1630 PRINT"1) YOU WILL CHOOSE A SUBJECT TO TUTOR
1640 PRINT"   FOR THE NEXT 12 WEEKS.
1650 PRINT"2) EACH WEEK YOU SET YOUR HOURLY RATE
1660 PRINT"3) FIND THE RULE WHICH CONNECTS THE
1670 PRINT"   YOURS YOU WORK WITH THE RATE YOU
1680 PRINT"   CHARGE.
1690 GOSUB7200
1740 RETURN
1800 REM------GET SUBJECT AREA----
1803 L=7:GOSUB5800
1810 PRINT"■CHOOSE THE SUBJECT AREA YOU WOULD LIKE
1820 PRINT"TO TUTOR:";
1825 INDENT=25
1830 FOR S=0 TO NS-1
1840 : PRINTTAB(INDENT)CHR$(65+S);". "SB$(S)
1850 NEXT S
1860 PRINTTAB(INDENT-3)"YOUR CHOICE: ";
1870 GOSUB 8000:IF A$<"A" OR A$>CHR$(65+NS-1)THEN1870
1880 PRINTA$;:CH=ASC(A$)-65
1890 GOSUB8000:IFA$<>CHR$(13)THENPRINT"▮▮ ▮▮";:GOTO1870
1892 LHRS=LHRS%(CH):MHRS=MHRS%(CH):MRATE=MRATE%(CH):THGHT$=THGHT$(CH)
1900 L=3:GOSUB5800:FORL=1 TO NS:PRINTTAB(INDENT-3)"                    ":NEXTL
1910 GOSUB 6800
1990 RETURN
2000 REM GET RATE&PRINT MAX HRS
2005 L=3:GOSUB 5800 CLEAR TOP OF SCREEN
2008 PRINT"■";
2030 PRINT"WHAT HOURLY RATE WILL YOU CHARGE? ";
2050 GOSUB 7400  GET POS. NMBR
2080 RATE=NMBR
2090 RETURN
2200 REM --TUTOR ONE WEEK--
2205 PRINT"■"; :REM CLEAR SCREEN
2210 GOSUB 3000PAINT TUTOR,TABLE
2220 GOSUB 3200 PAINT STATUS
2222 GOSUB7600 CLOCK
2225 GOSUB 3400 CALCULATE DEMAND
2227 PRINT"■■HOLD SHIFT AND PRESS @ FOR SHORTCUT
2230 FOR DAY=0 TO 4
2235 :GOSUB 4200 UPDATE DAY
2236 :FG=0
2237 :IF DAY=4 THEN FG=LHRS-INT(LHRS/5)*5
2240 :FOR HR=8 TO 7+INT(LHRS/5)+FG
2250 ::GOSUB 4000UPDATE CLOCK
2251 ::GOSUB 6200 RANDOMIZE WORK HRS
2252 ::IF FWRK=1 THEN GOSUB 4400
2253 ::IF FWRK=0 THEN GOSUB 5400
2255 ::GOSUB 3600 UPDATE HRS $$
2260 ::GET A$:IF A$="-" THEN 2300
2270 :NEXT HR
2280 :GOSUB 4000CLOCK
2290 NEXT DAY
```

```
2300 HR=-1:GOSUB4000CLEAR CLK
2301 DAY=4:GOSUB4200
2302 EARN(WNMBR)=DEMAN(WNMBR)*RATE
2305 RATE(WNMBR)=RATE
2308 HLFT=0
2310 WRKHR=DEMAN(WNMBR)
2330 R$="■":GOSUB 3200:GOSUB3600 UPDATE HRS $:R$=""
2340 GOSUB 3800 TGIF
2350 RETURN
2600 REM --PRINT SUMMARY--
2610 PRINT"■"TAB(14);"SUMMARY FOR
2612 B$=NAME$+"'S "+SB$(CH)+" TUTORING SERVICE"
2614 IFLEN(B$)<39THENPRINTTAB((39-LEN(B$))/2);
2616 PRINT"■"B$
2620 PRINT:PRINT
2630 PRINTTAB(12);"RATE";TAB(19);"HOURS";
2640 PRINTTAB(26);"DOLLARS"
2650 PRINTTAB(19);"WORKED";TAB(26);"EARNED"
2660 PRINT"──────────────────────────────────────"
2670 FOR I=1 TO MW
2680 :IF RATE(I)=0 AND DEMAN(I)=0 THEN 2730
2690 :PRINT"WEEK";I;TAB(12);FNRD(RATE(I));
2700 :PRINTTAB(19);FNRD(DEMAN(I));
2710 :PRINTTAB(26);FNRD(EARN(I))
2720 NEXT I
2730 RETURN
2800 REM --CLOSING MESSAGE--
2805 PRINT:PRINT
2810 PRINT"■COME BACK AND TUTOR AGAIN■"
2820 RETURN
3000 REM TUTOR,TABLE
3010 GOSUB6600 PAINT TUTOR
3060 GOSUB6800 PAINT TABLE
3110 RETURN
3200 REM PAINT STATUS
3210 X=0:Y=17:GOSUB8800 MOVE TO STATUS
3220 INDENT=25
3230 PRINTTAB(INDENT);"┌──────────────────"
3240 PRINTTAB(INDENT);"│FOR THIS WEEK"
3250 PRINTTAB(INDENT);"│ ──────────────────"
3260 PRINTTAB(INDENT);"│MONEY EARNED:"
3270 PRINTTAB(INDENT);"│$                  "
3280 PRINTTAB(INDENT);"│                   "
3290 PRINTTAB(INDENT);"│HOURS WORKED:"
3300 PRINTTAB(INDENT);"│        HOURS ";
3390 X=1:Y=24:GOSUB 8800 MV TO RATE
3395 PRINTR$;"$";FNRD(RATE);"■/HOUR    ";
3399 RETURN
3400 REM ---CALCULATE # HRS DEMANDED---
3410 DEMAN(WNMBR)=MHRS*(1-RATE/MRATE)
3420 IF DEMAN(WNMBR)>LHRS THEN DEMAN(WNMBR)=LHRS
3430 IF DEMAN(WNMBR)<0 THEN DEMAN(WNMBR)=0
3470 REM INITIAL. WEEKLY VARIABLES
3480 DLFT=DEMAN(WNMBR)
3482 WRKHR=0
3484 EARN(WNMBR)=0
3486 HLFT=LHRS
3599 RETURN
3600 REM ---UPDATE DOLLARS/HOURS---
3610 X=26:Y=21:GOSUB 8800 EARNED
```

```
3620 PRINT"          ■■■■■■■■■";
3630 PRINTR$;"$";FNRD(EARN(WNMBR));"■";
3640 X=26:Y=24:GOSUB 8800 HRS WORKED
3650 PRINT"      ■■■■■■";
3660 PRINTR$;FNRD(WRKHR);"■";
3799 RETURN
3800 REM ---PRINT TGIF---
3810 X=4 :Y=6:GOSUB8800
3820 PRINT"■TGIF■";
3830 RETURN
4000 REM ---UPDATE CLOCK---
4020 X=HX%(HT):Y=HY%(HT):GOSUB8800
4030 H=HT:IF HT=0 THEN H=12
4040 PRINTMID$(STR$(H),2)
4050 IFHR<0THENRETURN
4060 HT=HR:IF HR>11 THEN HT=HR-12
4080 X=HX%(HT):Y=HY%(HT):GOSUB8800
4090 H=HT:IF HT=0 THEN H=12
4100 PRINT"■"MID$(STR$(H),2)
4120 RETURN
4200 REM UPDATE DAY
4205 X=0:Y=3:GOSUB 8800 MOVE TO DAYS
4210 FOR I=0 TO 4
4220 :IF I=DAY THEN PRINT"■";DAY$(I);"■ ";
4230 :IF I<>DAY THEN PRINTDAY$(I);" ";
4240 NEXT I
4250 RETURN
4400 REM ---TUTOR ONE HOUR---
4410 GOSUB 4600 PAINT TUTEE
4420 GOSUB 4800 CONFUSE TUTEE
4430 GOSUB 5000 TUTOR TALKS
4435 GOSUB5200 UNCONFUSE TUTEE
4440 REM
4460 DLFT=DLFT-1
4470 WRKHR=WRKHR+1 :REM 1 MORE HR WRKED
4480 EARN(WNMBR)=WRKHR*RATE
4490 RETURN
4600 REM ---PAINT TUTEE---
4610 X=0:Y=10:GOSUB8800 MV TO HEAD
4620 INDENT=16
4630 PRINTTAB(INDENT);"  ____  "
4640 PRINTTAB(INDENT);". |o.o| ."
4650 PRINTTAB(INDENT);"  | - |  "
4660 PRINTTAB(INDENT);"  \____/  "
4670 PRINTTAB(INDENT);"    ▒    "
4680 PRINTTAB(INDENT);" /▀▀▀▀\ "
4690 PRINTTAB(INDENT);" |▚▚▚▚| "
4700 PRINTTAB(INDENT);" |▚▚▚▚| ";
4710 RETURN
4800 REM ---CONFUSE TUTEE---
4810 X=18:Y=12:GOSUB8800 MV TO SMIL
4820 PRINT"⌒";
4830 X=18:Y=9:GOSUB8800 MV 2 MIND
4840 PRINT"!?!■■■■   ■■■■   ";
4850 RETURN
5000 REM ---TUTOR'S THOUGHTS---
5005 THOUGHT=THOUGHT+5
5007 IF THOUGHT>LEN(THOUGHT$) THEN THOUGHT=1
5008 X=4:Y=10:GOSUB8800 MV 2 MOUTH
5009 PRINT" ── ";
```

```
5010 FOR I=THOUGHT TO THOUGHT+4
5030 :X=4:Y=6:GOSUB8800 MV 2 MIND
5040 :PRINTMID$(THOUGHT$,I,4);
5060 NEXT I
5070 RETURN
5200 REM ---TUTEE SEES LIGHT---
5210 X=18:Y=9:GOSUB8800 MV TO MIND
5220 PRINT"    ▮▮▮
```

```
6440 :PRINTMID$(GRUMBLE$,I,4);
6460 NEXT I
6470 RETURN
6500 REM ---TUTOR'S THOUGHTS---
6600 REM TUTOR
6605 POKE59468,12:X=0:Y=7:GOSUB 8800 MOVE TO HEAD
6610 PRINT"    ,-----."
6615 PRINT"    |O   O|"
6620 PRINT"   *|  =  |*"
6625 PRINT"    |  --  |"
6630 PRINT"    `-   -'"
6635 PRINT"     _| |_"
6640 PRINT"    / .. \"
6645 PRINT"    |.... |"
6650 PRINT"    |.... |"
6655 PRINT"    |.... |       "
6790 RETURN
6800 REM----TABLE---
6810 X=0:Y=17:GOSUB8800
6860 PRINT"┌──────────────────┐"
6865 PRINT"|                  ┌─────────┐"
6870 PRINT"|                  |         |"
6875 PRINT"|                  |         |"
6880 PRINT"| TUTORING         |         |"
6885 PRINT"| SERVICE          |         |"
6890 PRINT"|                  |         |"
6895 PRINT"|                  |         |";
6900 X=1:Y=18:GOSUB 8800
6905 PRINTLEFT$(NAME$,12);"'S
6907 IF CH>-1 THEN PRINT:PRINTTAB(1)"■"SB$(CH)
6910 RETURN
7000 REM --YES/NO QUESTION ASKER--
7005 YES=0
7010 PRINT"(■Y■ OR ■N■)?  ■";
7020 GOSUB 8000:A=ASC(A$)
7027 IF A=13 THEN 7020
7030 IFA$=" |"ORA$="Y"THENYE=TR:GOTO7080
7040 IFA$="/" OR A$="N" THEN GOTO 7080
7050 GOTO 7020
7080 PRINTA$;
7090 GOSUB 8000: A=ASC(A$)
7095 IF A=20 THEN PRINT"■■■
```

```
 7450 PRINT:NMBR=VAL(NMBR$)
 7460 RETURN
 7600 REM PAINT CLOCK
 7610 FOR H = 0 TO 11
 7620 X=HX%(H):Y=HY%(H):GOSUB8800
 7625 I=HT:IF HT=0 THEN I=12
 7630 PRINTMID$(STR$(H),2)
 7640 NEXT:RETURN
 8000 REM---GET SINGLE CHAR----
 8010 T=TI
 8020 IF TI<T+30 THEN PRINT"▒▌";:GOTO 8050
 8030 IF TI<T+60 THEN PRINT" ▌";:GOTO 8050
 8040 T=TI
 8050 GET A$:IF A$="" THEN 8020
 8060 PRINT" ▌";:RETURN
 8200 REM----GET STRING----
 8220 GOSUB 8000:A=ASC(A$)
 8240 IFB$=""AND A=20 THEN 8220
 8250 IF B$="" AND A=13 THEN RETURN
 8260 IF A=13 THEN PRINTA$;:RETURN
 8270 IF A=20 AND LEN(B$)<2 THEN PRINTA$;:B$="":GOTO 8220
 8280 IF A=20 THEN PRINTA$;:B$=LEFT$(B$,LEN(B$)-1):GOTO 8220
 8290 IF A<32 OR (A>127 AND A<161) THEN 8220
 8315 IF LEN(B$)>=19 THEN 8220
 8320 PRINTA$;:B$=B$+A$
 8325 IFA$=CHR$(34)THENPRINTCHR$(34)"▌";
 8340 GOTO 8220
 8400 REM---GET NON-EMPTY STRING---
 8410 B$="":POKE 158,0
 8420 GOSUB 8200
 8430 IF B$="" THEN 8420
 8440 RETURN
 8800 REM-TO X,Y-
 8810 PRINT"┐":PRINT"┘";
 8820 IFX=0ANDY=0THEN RETURN
 8830 IFX=0THENPRINTLEFT$(D$,Y);:RETURN
 8840 IFY=0THENPRINTTAB(X);:RETURN
 8850 PRINTLEFT$(D$,Y)TAB(X);
 8860 RETURN
 9000 REM-----INIT THOUGHTS---
 9010 TH$(0)="WHAT GOES UP MUST COME ____?START FIRES BY RUBBING TWO SCOUTS"
 9020 TH$(0)=TH$(0)+" ELECTRONS PROTONS NEUTRONS...EVOLUTION CAUSES REVOLUTION"
 9030 TH$(1)="THIS SENTENCE IS FALSE.  A PENCIL COSTS 5 CENTS MORE THAN AN"
 9040 TH$(1)=TH$(1)+" ERASER.  TOGETHER THEY COST 25 CENTS.  HOW MUCH IS THE"
 9050 TH$(1)=TH$(1)+" ERASER?  PYTHAGORAS LOVED TRIANGLES AND MUSIC"
 9060 TH$(2)="SUBJECT?  PREDICATE?  OBJECT?  WHY ARE YOU SO TENSE?  WHAT IS AN"
 9070 TH$(2)=TH$(2)+" ADVERB???  DESCRIBE YOURSELF IN TWO INCOMPLETE SENTENCES"
 9080 TH$(3)="HOLA ISABEL.  COMO ESTA USTED?  ESTA BIEN?  YO ESTOY BIEN "
 9090 TH$(3)=TH$(3)+"TAMBIEN.  DONDE ESTA LA COCINA?  PORQUE EL CIELO IS AZUL?"
 9100 TH$(4)="BASIC PASCAL FORTRAN COBOL SMALLTALK FORTH ARE LANGUAGES THAT"
 9110 TH$(4)=TH$(4)+" COMPUTERS SPEAK.  TEACH THE COMPUTER TO DANCE."
 9120 TH$(4)=TH$(4)+"  SUBROUTINE BYTE NIT NIBBLE DATA ARRAY GIGO"
 9180 GRUMBLE$="MY IT'S QUIET THIS WEEK..TIC..TIC...LA..DEE..DAH....ZZZ...ZZZZ"
 9190 RETURN
READY.
```

## SERVICE 2.1 DCAT

```
READY.

 10 SYS1039:RUN
READY.


READY.

 50 VERS=2.1
 55 REM AT YOUR SERVICE, VERSION 2.1
 60 REM COPYRIGHT 1981, MATH NETWORK CURRICULUM PROJECT, SFSU
 65 GOTO11600
 200 REM-NETIN-
 210 I$="":D1$="R
 220 GOSUB400:IF(PEEK(SQ)ANDRF)<>1THEN220
 230 SYSRX:A$=CHR$(PEEK(RB)):IFA$=RT$THENPRINT"■ ▮▮";:SYSSD:RETURN
 240 I$=I$+A$:GOTO220
 400 REM-BLNKCRSR
 405 GETA$:IFA$=CHR$(3)THENSYSSD:GOTO12800
 410 IFDTHENPRINT"■"D1$"▮▮";:D=FA:RETURN
 420 PRINT"■"D1$"▮▮";:D=TR:RETURN
 600 REM-NTOUT
 610 SYSBS:D1$="S":FORI=1TOLEN(O$):GOSUB400:POKEXB,ASC(MID$(O$,I,1)):SYSTX
 615 NEXT
 620 POKEXB,13:SYSTX:PRINT"■ ▮▮";:GOTO200
 1200 REMINIT
 1205 MA=30:OF=65:TR=-1:FA=0:MS=20:AE=.00009:HN=80:NL=-1:CB=1
 1210 DIM SK$(MS),SK(MS),KEY$(MA),P2(10),P3(10),P4(10)
 1220 DATA ↑,+,-,*,/,LCM,GCD,RMD,RANDOM,MAXIMUM
 1230 DATAMINIMUM,END,AD,RATE,END,SQR,INT,END
 1240 NK=0
 1250 R2=NK+OF:GOSUB1400:R0=NK+OF:GOSUB1400:R1=NK+OF:GOSUB1400
 1260 FORI=R2+5TOR0-1:R2$=R2$+CHR$(I):NEXTI
 1270 FORI=R0TOR1-1:R0$=R0$+CHR$(I):NEXT:FORI=R1TOOF+NK-1:R1$=R1$+CHR$(I):NEXT
 1280 FORI=R1TOOF+NK-1:R1$=R1$+CHR$(I):NEXTI
 1290 BS=1048:SQ=BS+15:RB=BS+17:XB=BS+18:TX=BS+9:RX=BS+6:RF=1:SD=BS+3
 1295 P=PEEK(59271):P=-88*(P=170ORP=29)-49*(P=210):POKE144,P:P=P-3
 1300 ML=3:DIMPG$(ML+1),PT$(ML):RT$=CHR$(13):ES$="—":AC$="▒
 1310 BL$="                                                  "
 1320 D$="▯▯▯
```

```
1825 A=ASC(A$)
1830 RETURN
1855 B$=""
1860 GOSUB1800:IFB$=""ANDA=20THEN1860
1862 IFA$=AC$ORA$=ES$THENB$=A$:RETURN
1865 IFLEN(B$)=30ANDA<>13ANDA<>20THEN1860
1880 IFA=13THENRETURN
1890 IFA=20ANDLEN(B$)<2THENPRINTA$;:B$="":GOTO1860
1900 IFA=20THENPRINTA$;:B$=LEFT$(B$,LEN(B$)-1):GOTO1860
1910 IFA<32OR(A>127ANDA<161)THEN1860
1920 PRINTA$;:B$=B$+A$:IFA=34THENPRINTCHR$(34)+"■";
1930 GOTO1860
1940 IF(V1<1)OR(V2<1)THENRE=FA:RETURN
1950 IF(V2-INT(V2))>AETHENRE=FA:RETURN
1955 IF(V1-INT(V1))>AETHENRE=FA:RETURN
1960 EE=0:RETURN
1970 IFV1<0THENRE=FA:RETURN
1980 GOTO1955
1990 IF(V2<>-1)ANDV2THENRE=FA:RETURN
1992 IF(V1<>-1)ANDV1THENRE=FA:RETURN
1995 EE=0:RETURN
2000 REMPUSHSTR
2020 SK$(SS)=SK$:SS=SS+1:GOTO400
2200 REMPOPSTR
2220 SS=SS-1:SK$=SK$(SS):GOTO400
2400 REMPUSHNUM
2420 SK(SN)=SK:SN=SN+1:GOTO400
2600 REMPOPNUM
2620 SN=SN-1:SK=SK(SN):GOTO400
2800 P0$=P1$:IFP1>LEN(I$)THENP1$="":GOTO2990
2840 IFP1>LEN(I$)THENP1$="":GOTO2990
2850 IFMID$(I$,P1,1)=" "THENP1=P1+1:GOTO 2840
2860 P1$=MID$(I$,P1,1):P1=P1+1
2990 RETURN
3000 GOSUB3200:GOSUB3400:IFNOTREORERTHEN3190
3035 IF P1$<>""THENRE=FA:GOTO3190
3040 GOSUB2200:O$=SK$:PRINT"■ ■";
3190 RETURN
3200 P0=1:P1=1:GOSUB2800:ER=FA:RE=TR:SS=0:SN=0:O$="":LV=0:OV=11:D1$="T":RETURN
3400 LV=LV+1:IFLV>OVTHEN8800
3410 GOSUB3600:IFNOTRETHEN3590
3590 GOTO8900
3600 LV=LV+1:IFLV>OVTHEN8800
3610 P2(LV-2)=1:GOTO3800
3620 IFNOTRETHEN3790
3630 GOSUB5000:IFNOTRETHENRE=TR:GOTO 3790
3650 P2(LV-2)=2:GOTO3800
3660 IFNOTRETHENRE=FA:ER=TR:GOTO3790
3670 GOSUB2200:T$=SK$:GOSUB2200:R$=SK$:GOSUB2200:E$=SK$
3700 SK$=R$+" "+E$+" "+T$:GOSUB2000:GOTO3630
3790 GOTO8900
3800 REMTERM
3810 P3(LV-2)=1:GOTO4000
3820 IFNOTRETHEN3990
3830 GOSUB4800:IFNOTRETHENRE=TR:GOTO3990
3850 P3(LV-2)=2:GOTO4000
3860 IFNOTRETHENRE=FA:ER=TR:GOTO3990
3870 GOSUB2200:F$=SK$:GOSUB2200:R$=SK$:GOSUB 2200:T$=SK$
3900 SK$=R$+" "+T$+" "+F$:GOSUB2000:GOTO3830
3990 ONP2(LV-2)GOTO3620,3660
```

```
4000 REMFACTOR
4010 GOSUB5000:SK=RE:GOSUB2400
4015 P4(LV-2)=1:GOTO4200
4020 IFERTHEN4150
4040 SK=RE:GOSUB2400
4050 GOSUB5300:IFNOTRETHENRE=TR:GOTO4080
4055 P4(LV-2)=2:GOTO4200
4060 IFNOTRETHENER=TR:GOTO4150
4074 GOSUB2200:F2$=SK$:GOSUB2200:P$=SK$:GOSUB2200:F1$=SK$
4079 SK$=P$+" "+F1$+" "+F2$:GOSUB 2000:GOTO4050
4080 GOSUB2600:IFNOTSKTHEN4150
4100 GOSUB2600:IFNOTSKTHEN4150
4120 GOSUB2200:F$=SK$:GOSUB2200:R$=SK$:SK$=R$+" 0 "+F$:GOSUB2000
4150 ONP3(LV-2)GOTO3820,3860
4200 REMPRIMARY
4210 IFP1$="."OR(P1$)="0"ANDP1$<="9")THENGOSUB4600:GOTO4390
4220 IFP1$)="A"ANDP1$<="Z"THENGOSUB4400:GOTO4390
4230 IFP1$<>"("THENRE=FA:ER=TR:GOTO 4390
4240 GOSUB2800:GOSUB3400:IFNOTRETHENRE=FA:ER=TR:GOTO4390
4270 IFP1$<>")"THENRE=FA:ER=TR:GOTO 4390
4280 RE=TR:GOSUB2800
4390 ONP4(LV-2)GOTO4020,4060
4400 LV=LV+1:IFLV>OVTHEN8800
4410 NM$="
4420 IFP1$<"A"ORP1$>"Z"THEN4440
4430 GOSUB2800:NM$=NM$+P0$:GOTO4420
4440 S$=R2$:GOSUB5600:IFRETHENGOSUB6200:GOTO4590
4450 S$=R1$:GOSUB5600:IFRETHENGOSUB6400:GOTO4590
4460 S$=R0$:GOSUB5600:IFNOTRETHENER=TR
4590 GOTO8900
4600 SK$="
4620 IFP1$<"0"ORP1$>"9"THEN4700
4630 GOSUB2800:SK$=SK$+P0$:GOTO4620
4700 IFP1$<>"."THEN4780
4710 IFLEN(SK$)=0THENSK$="0
4720 GOSUB2800:SK$=SK$+P0$
4730 IFP1$<"0"ORP1$>"9"THEN4780
4740 GOSUB2800:SK$=SK$+P0$:GOTO4730
4780 IFLEN(SK$)>0THENRE=TR:GOSUB2000:GOTO4790
4785 RE=FA
4790 RETURN
4800 IFP1$<>"*"ANDP1$<>"/"THENRE=FA:GOTO4990
4820 GOSUB2800:NM$=P0$:GOSUB6000:RE=TR:SK$=C$:GOSUB2000
4990 RETURN
5000 IFP1$<>"+"ANDP1$<>"-"THENRE=FA:RETURN
5020 GOTO4820
5300 IFP1$<>"↑"THENRE=FA:RETURN
5320 GOTO4820
5400 IFP1$=""THENRE=FA:GOTO 5590
5410 P0=P1:GOSUB2800:NM$=P0$:IFP1$=""THENRE=FA:P1=P0-1:GOSUB2800:GOTO5590
5420 GOSUB2800:NM$=NM$+P0$:CC=2:GOSUB5600:IFRETHEN5590
5430 GOSUB5600:IFRETHEN5590
5450 IFCC=NAORP1$=""THENRE=FA:P1=P0-1:GOSUB2800:GOTO5590
5460 GOSUB2800:NM$=NM$+P0$:CC=CC+1:GOTO5430
5590 RETURN
5600 GOSUB6000:IFNOTRETHEN5790
5640 FORC=1TOLEN(S$):RE=FA:IFMID$(S$,C,1)=C$THENRE=TR:C=LEN(S$)
5660 NEXTC
5670 IFRETHENSK$=C$:GOSUB2000
5790 RETURN
```

```
6000 RE=FA:FORC=0TONK-1:IFNM$=KE$(C)THENRE=TR:C$=CHR$(C+OF):C=NK-1
6010 NEXTC:RETURN
6200 IFP1$<>"("THEN6380
6220 GOSUB2800:GOSUB3600:IFNOTRETHEN6380
6230 IFP1$<>","THEN6380
6240 GOSUB2800:GOSUB3600:IFNOTRETHEN6380
6250 IFP1$<>")"THEN6380
6260 GOSUB2800:GOSUB2200:F$=SK$:GOSUB2200:F$=SK$+" "+F$
6280 GOSUB2200:SK$=SK$+" "+F$:GOSUB2000:GOTO6390
6380 ER=TR:RE=FA
6390 RETURN
6400 IFP1$<>"("THEN6580
6420 GOSUB2800:GOSUB3400:IFNOTRETHEN6580
6430 IFP1$<>")"THEN6580
6440 GOSUB2800:GOSUB2200:F$=SK$:GOSUB2200:SK$=SK$+" "+F$:GOSUB2000:GOTO6590
6580 ER=TR:RE=FA
6590 RETURN
7000 GOSUB7200:GOSUB7400:IFNOTRETHEN7190
7050 GOSUB 2600:OU=SK:PRINT"■ ▮▮";
7190 RETURN
7200 P1=1:D1$="T
7220 IFP1>LEN(I$)THENPRINT"ERROR IN INITTING OF EVAL":STOP
7230 P1$=MID$(I$,P1,1):P1=P1+1:IFP1$=" "THEN7220
7235 ER=FA:RE=TR:SS=0:SN=0:RETURN
7400 RE=TR:C$=P1$:GOSUB8000:IFC$>="0"ANDC$<="9"THENSK=VAL(T$):GOTO7580
7440 IFASC(C$)>=R0ANDASC(C$)<R1THENGOSUB8400:GOTO7580
7460 SK$=C$:GOSUB2000:GOSUB7400:GOSUB2200:C$=SK$:IFNOTRETHEN7590
7500 GOSUB2600:V1=SK:IFASC(C$)>=R1THENGOSUB8600:GOTO7580
7530 SK$=C$:GOSUB2000:SK=V1:GOSUB2400:GOSUB7400:GOSUB2200:C$=SK$
7560 IFNOTRETHENGOSUB2600:GOTO7590
7570 GOSUB2600:V2=SK:GOSUB2600:V1=SK:GOSUB7600
7580 GOSUB2400
7590 RETURN
7600 ONASC(C$)-(R2-1)GOTO7607,7610,7620,7630,7640
7606 ON ASC(C$)-(R2+4)GOTO7730,7740,7750,7760,7780,7790
7607 IFLOG(ABS(V1)+.1)*V2)=HNTHENEE=5:RE=FA:RETURN
7608 SK=V1↑V2:IF(V1=INT(V1))AND(V2=INT(V2))THENSK=INT(SK+.5)
7609 RETURN
7610 SK=V1+V2:RETURN
7620 SK=V1-V2:RETURN
7630 IFLOG(ABS(V1)+.1)+LOG(ABS(V2)+.1)>HNTHENEE=3:RE=FA:RETURN
7635 SK=V1*V2:RETURN
7640 IFV2=0THENEE=4:RE=FA:RETURN
7645 SK=V1/V2:RETURN
7730 EE=11:GOSUB1940:IFEETHENRETURN
7731 IFV1<V2THENV3=V2:GOTO7734
7732 V3=V1:V1=V2:V2=V3
7734 IFINT(V2/V1)<>V2/V1THENV2=V2+V3:GOTO7734
7736 SK=V2:RETURN
7740 EE=12:GOSUB1940:IFEETHENRETURN
7741 IFV1>V2THENV3=V2:V2=V1:V1=V3:GOTO7744
7742 V3=V1
7743 IFV3<=0THEN7746
7744 IF(INT(V2/V3)<>V2/V3)OR(INT(V1/V3)<>V1/V3)THENV3=V3-1:GOTO7743
7746 SK=V3:RETURN
7750 IFV2=0THENRE=FA:EE=8:RETURN
7755 SK=V1-INT(V1/V2)*V2:RETURN
7760 SK=INT(RND(1)*(V2-V1+1)+V1):RETURN
7780 SK=V1:IFV2>V1THENSK=V2:RETURN
7782 RETURN
```

```
7790 SK=V1:IFV2<V1THENSK=V2:RETURN
7792 RETURN
7800 P0$=P1$
7820 IFP1>LEN(I$)THENP1$="":GOTO7990
7830 P1$=MID$(I$,P1,1):P1=P1+1
7990 RETURN
8000 T$="
8030 IFP1$=" "THENGOSUB7800:GOTO8030
8040 IFP1$=" "ORP1$=""THEN8150
8050 GOSUB7800:T$=T$+P0$:GOTO8040
8150 IFP1$=" "THENGOSUB7800:GOTO8150
8190 RETURN
8400 ONASC(C$)-R0+1GOTO8420,8430
8420 SK=AE:RETURN
8430 SK=RA:RETURN
8600 ONASC(C$)-R1+1GOTO8620,8660
8620 IFV1<0THENRE=0:EE=6:RETURN
8625 SK=SQR(V1):RETURN
8655 RETURN
8660 SK=INT(V1):RETURN
8800 PRINT"|HAT'S TOO COMPLICATED. |RY AGAIN."LV:ER=TR:RES=FA:LV=LV-1:RETURN
8900 LV=LV-1:RETURN
9000 PRINT"、DON'T KNOW WHAT TO DO
9020 EE=EE-2:IFEE>5THENEE=EE-1
9025 IFEE>6THENEE=EE-2
9050 ONEEGOSUB9104,9108,9112,9118,9116,9200,9204
9060 RETURN
9104 PRINT"*";
9105 PRINT" CAUSES TOO LARGE A NUMBER":RETURN
9108 PRINT"/";
9109 PRINT" CAUSES DIVISION BY ZERO":RETURN
9112 PRINT"↑";:GOTO9105
9116 PRINT"RMD";:GOTO9109
9118 PRINT"SQR OF NEGATIVE NUMBER":RETURN
9200 PRINT"LCM";
9201 PRINT" OF NON-NATURAL NUMBER(S)":RETURN
9204 PRINT"GCD";:GOTO9201
9301 PRINT" CONNECTS NON-TRUTH EXPRESSION(S)":RETURN
9600 Y=24:GOSUB9800:PRINT"■|O GO ON PRESS RETURN■ ";:GOSUB1800:IFA<>13THEN9600
9610 PRINT"□":PRINTLEFT$(BL$,21);:RETURN
9800 PRINT"■";:IFY>0THENPRINTLEFT$(D$,Y);
9810 RETURN
10000 REMMAIN(RUN PROG)
10005 GOSUB10200
10010 GOSUB10300
10015 FORWN=0TO9
10020 PRINT"□■■DEEK #"WN+1"■
10025 GOSUB10500
10030 GOSUB10600
10035 GOSUB10700
10040 GOSUB10800
10045 GOSUB10845
10050 NEXTWN
10055 IFWN=9THENGOSUB9600
10060 GOSUB10100
10065 GOSUB9600
10070 GOTO11200
10100 REMSMMARY
10110 PRINT"□■■|ERE IS A SUMMARY OF YOUR EARNINGS:■
10115 CM=0
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10120 IFAFTHENPRINTTAB(CM);"■♦DS■";:CM=CM+8
10125 PRINTTAB(CM);" |OURLY";TAB(CM+8);" |OURS
10130 PRINTTAB(CM);"_ATE";TAB(CM+8);"oORKED";TAB(CM+15);"-NCOME
10135 T=0:FORI=0TOWM
10140 IFAFTHENPRINTTAB(CM-8);AE(I);
10145 PRINTTAB(CM);CE(I);TAB(CM+8);HW(I);TAB(CM+15);FNRD(CE(I)*HW(I)-AE(I))
10150 T=T+CE(I)*HW(I)-AE(I):NEXTI
10155 PRINTTAB(CM+8);"|OTAL: ■";FNRD(T)
10160 RETURN
10200 REMCOMPILE
10210 AF=0:WE=0:CE=0:AE=0
10220 IFPG$(2)="Y"ORPG$(2)=" |"THENAF=1
10230 HM=VAL(PG$(1))
10240 WE=HM
10250 I$=PG$(ML+1)
10260 RETURN
10300 REMWELCOM
10310 PRINT"■■■
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```
10784 RETURN
10800 REMACCT
10805 IFEETHENPRINT"■■■■":GOTO10865
10810 PRINT"■■■■■      OEEK #";WN+1;"♠CCOUNTS:■■
10820 IFAFTHENPRINT"♠DVERTISING              :$";AE
10825 PRINT" |OURLY _ATE              :$";CE
10830 PRINT" |OURS OORKED             : ";HW
10835 PRINT"↖NCOME                    :$";FNRD(HW*CE-AE):RETURN
10840 REMAGAIN
10845 IFWN=9THENWM=9:GOTO10865
10850 PRINT"■⊢O YOU WANT TO WORK ANOTHER":PRINT"WEEK? (■ ■ OR ■/■) ";:GOSUB1855
10855 ER$="":GOSUB11800:IFER$<>""THENPRINTER$:GOTO10845
10860 IFB$="N"ORB$="/"THENWM=WN:WN=9
10865 RETURN
10899 REMPROMPT
10900 DATA" |OUR BUSINESS NAME IS:","|HE MOST HOURS A PLAYER MAY WORK IS:
10907 DATA"⊣AN PLAYERS ADVERTISE? (■ ■ OR ■/■):
10910 DATA"|HE HOURS OF WORK A PLAYER GETS =
10950 FORQQ=0TOML:READPT$(QQ):NEXTQQ
10960 DIM WE(9),AE(9),CE(9),HW(9)
10970 DEFFNRD(X)=INT(X*100+.5)/100
10990 RETURN
11000 PRINT"■":FORQQ=0TOML:Y=3*QQ:GOSUB9800:PRINTQQ+1;"■■.";PT$(QQ)
11010 IFPG$(QQ)<>""THENPRINT"     ";PG$(QQ);:NEXTQQ:QQ=0
11015 IFNL=0THENY=22:GOSUB9800:PRINT"|YPE SHIFT ■&■ WHEN YOU FINISH EDITING
11020 FORQV=QQTOML
11030 GOSUB12700:Y=QV*3:GOSUB9800:PRINTQV+1;"■■.";PT$(QV)
11040 B$=PG$(QV):GOSUB12600:PRINT"     ";B$;:GOSUB1860
11050 IFB$<>AC$ANDB$<>ES$THENPG$(QV)=B$
11060 IFB$=""THEN11030
11065 IFB$=ES$THEN11200
11070 IFB$<>AC$THEN11080
11075 IFNL=-1THENGOSUB11400
11078 GOTO11200
11080 Y=20:GOSUB9800:ER$="
11090 ONQV+1GOSUB12000,12500,11800,12400
11095 IFER$=""THEN11105
11100 PRINT"↖ DON'T UNDERSTAND.":PRINTER$;:GOSUB9600
11102 GOTO11030
11105 PG$(QV)=B$
11110 NEXTQV:NL=0:GOTO11000
11120 FORQQ=0TOML:IFPG$(QQ)<>""THENNEXTQQ:NL=0:RETURN
11130 QQ=ML:NEXTQQ:NL=-1:RETURN
11200 REMMENU
11210 PRINT"■";TAB(10);"■♠■|  ■■■ ♠■■■■■■■ ■■■■■■■
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11510 GOSUB11400:GOTO11000
11600 REMTITLE
11605 PRINT"■";:POKE59468,14
11610 PRINT"■■■R";TAB(10);"↑T  )OUR ↑ERVICE "VERS
11615 PRINTTAB(6)"■■A PART OF THE |USINESS ⁄NIT
11620 PRINT"■■ BY THE \ATH ⁄ETWORK —URRICULUM ¬ROJECT
11625 PRINTTAB(19)"■OF
11630 PRINTTAB(5)"■↑AN —RANCISCO ↑TATE ⁄NIVERSITY
11640 PRINTTAB(6)"■■3.0 OR 4.0 |↑↑\— FOR THE ¬┬|
11780 GOSUB1200:GOSUB9600:GOTO11200
11800 REMYORN TST
11810 X$=LEFT$(B$,1)
11820 IFX$="Y"ORX$=" |"ORX$="N"ORX$="⁄"THENB$=X$:GOTO11840
11830 ER$="\NPUT NOT ■ ■ OR ■⁄■
11840 RETURN
12000 REMLNGTHTST
12030 RETURN
12200 REMNUMBER
12205 IFB$>"9"THENER$="¬LEASE TYPE IN A NUMBER.":RETURN
12210 B$=STR$(VAL(B$)):B$=RIGHT$(B$,LEN(B$)-1)
12220 IFVAL(B$)<=HIANDVAL(B$)>=LOTHEN12240
12230 ER$="|HERE AREN'T THAT MANY HOURS IN A WEEK.
12240 RETURN
12400 REMREWRITTER
12410 I$=B$:GOSUB3000:IFNOTERANDRETHEN12430
12420 IFER$=""THENER$=" "
12430 PG$(ML+1)=O$:RETURN
12500 REMMAXHRS
12510 HI=168:LO=1:GOSUB12200:RETURN
12600 PRINTBL$"■":RETURN
12700 Y=20:GOSUB9800:GOSUB12600:PRINT:GOSUB12600:RETURN
12800 REMQUIT
12805 PRINT"■":POKE59468,12
12810 PRINT"■GOOD-BYE FROM ↑T YOUR ↑ERVICE
12820 PRINT"■■PLEASE MAKE SURE THE PHONE IS HUNG UP.
12830 PRINT"■■■TO LIST THIS PROGRAM, PRESS RETURN TWICE
12840 PRINT"■■POKE40,51:POKE41,6:LIST■■■■
12850 POKE40,1:POKE41,4:POKE144,P:END
13000 REMNT LD
13005 PRINT"■■⁄ET LOAD
13010 GOSUB13800:IFB$=ES$THEN11200
13020 PRINT:PRINT"■⁄AME OF ↑ERVICE
13030 PRINT"TO LOAD: ";
13040 B$="":GOSUB1860:NM$=LEFT$(B$,16)
13050 IFB$=ES$THEN13130
13060 O$="DSR"+NM$:GOSUB600:Y$=I$
13070 IFLEFT$(I$,4)<>"DSRT"THENPRINT:PRINT"⁄OT FOUND":GOTO13020
13080 GOSUB11400
13090 GOSUB13200:IFERTHENNL=-1:GOTO13020
13100 IFRETHEN13125
13110 NL=NL+1:PG$(NL)=B$
13120 GOTO13090
13125 PRINT:PRINT"■"PG$(0)" ↑UCCESSFULLY LOADED":GOSUB9600
13130 NL=0:GOTO11200
13200 REMGT LN
13210 RES=FA:ER=FA:X$=MID$(Y$,5,4)
13220 IFX$="0000"THENRE=TR:RETURN
13230 O$="DSS"+X$:GOSUB600:Y$=I$
13235 IFLEFT$(I$,4)<>"DSST"THENPRINT:PRINT"⁄ET ERROR":ER=TR:GOSUB9600:RETURN
13240 B$=MID$(Y$,9)
```

```
 13250 RETURN
 13400 REMNT SV
 13405 PRINT"■R/ET ♥AVE "PG$(0)
 13410 GOSUB13800:IFB$=ES$THEN11200
 13420 IFB$=ES$THEN13540
 13430 SN$=LEFT$(PG$(0),16)
 13440 PRINT:PRINT" ■UR NAME: ";
 13450 B$="":GOSUB1860:NM$=LEFT$(B$,16):PRINT
 13455 IFB$=ES$THEN13540
 13460 GOSUB14200
 13470 O$="DSA"+O$+NM$+SN$:GOSUB600
 13480 IF LEFT$(I$,4)<>"DSAT"THENPRINTSN$" IN USE!":GOSUB13900:GOTO13420
 13490 B$=MID$(I$,5)
 13500 FORN=0TOML+1
 13510 O$="DSL"+B$+PG$(N):GOSUB600
 13520 IFLEFT$(I$,4)<>"DSLT"THEN PRINT "/ET ERROR":N=ML+1:GOSUB9600
 13530 NEXT N
 13535 PRINT"■"PG$(0)" SUCCESSFULLY SAVED":GOSUB9600
 13540 GOTO11200
 13600 REMNTNMS
 13610 PRINT"■R■OOK AT NET NAMES
 13620 GOSUB13800:IFB$=ES$THEN11200
 13630 PRINT"|YPE THE FIRST FEW LETTERS OF NAMES
 13640 PRINT"YOU WISH TO SEE, OR HIT <RETURN> TO
 13650 PRINT"SEE THEM ALL: ";:B$="":GOSUB1860:SK$=B$:PRINT
 13660 O$="DSN000"+SK$
 13670 GOSUB600:IFMID$(I$,4,1)<>"T"THEN13700
 13680 PRINTMID$(I$,8):GETA$:IFA$="-"THENGOTO13700
 13690 O$="DSN"+MID$(I$,5,3)+SK$:GOTO13670
 13700 GOSUB9600:GOTO11200
 13800 REMDIAL
 13810 PRINT:B$="
 13820 PRINT" ■AVE YOU DIALLED THE NETWORK? ";:GOSUB1860
 13830 PRINT:IFLEFT$(B$,1)="Y"ORB$=ES$THENRETURN
 13840 PRINT"■LEASE DIAL 469-2125
 13850 O$="SERVICE HELLO":GOSUB600
 13860 PRINTI$
 13870 RETURN
 13900 REMGETNME
 13910 PRINT:PRINT"/AME OF SERVICE: ";:B$="":GOSUB1860:IFB$=ES$THENRETURN
 13915 PG$(0)=LEFT$(B$,16):PRINT
 13920 RETURN
 14200 REMO$
 14210 O$=MID$(STR$(LEN(NM$)),2):IFLEN(O$)<2THENO$="0"+O$
 14220 RETURN
READY.
```